

### Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

### Listing of Claims:

1. (Currently Amended) A semiconductor device comprising:
  - a first semiconductor layer that is formed from a first semiconductor material;
  - a second semiconductor layer that is formed from a second semiconductor material on the first semiconductor layer;
  - a two-dimensional carrier that is formed within the first semiconductor layer and in the vicinity of an interface between the first semiconductor layer and the second semiconductor layer;
  - a first concave portion that is formed ~~extending penetrating at least the second semiconductor layer~~ from a primary surface of the second semiconductor layer that faces the interface between the first semiconductor layer and the second semiconductor layer ~~as far as the interface, and is formed from the interface to a predetermined depth in the first semiconductor layer;~~
  - a first electrode that is formed on a bottom surface and side surface of the first concave portion and that forms a Schottky junction ~~between the first and second to the~~ semiconductor layers ~~which contact the bottom surface and the side surface of the first concave portion;~~ and
  - a second electrode that is formed in an area of the second semiconductor layer that is located away from the first electrode and that forms a low resistance contact with the second semiconductor layer.

2. (Currently Amended) ~~The semiconductor electrode according to claim 1, wherein A~~  
semiconductor device comprising:

a first semiconductor layer that is formed from a first semiconductor material;

a second semiconductor layer that is formed from a second semiconductor material on the  
first semiconductor layer;

a two-dimensional carrier that is formed within the first semiconductor layer and in the  
vicinity of an interface between the first semiconductor layer and the second semiconductor layer,

a first concave portion that is formed from a primary surface of the second semiconductor  
layer that faces the interface between the first semiconductor layer and the second semiconductor  
layer reaching at least the interface, and the first electrode is formed so as to extend from the  
primary surface of the second semiconductor layer as far as the two-dimensional carrier, or is  
formed so as to face the two-dimensional carrier and separated therefrom by a distance that  
allows a quantum mechanical tunnel effect with the two dimensional carrier to be obtained;

a first electrode that is formed on a bottom surface and a side surface of the first concave  
portion and that forms a Schottky junction to the semiconductor layers which contact the bottom  
surface and side surface of the first concave portion; and

a second electrode that is formed in an area of the second semiconductor layer that is  
located away from the first electrode and that forms a low resistance contact with the second  
semiconductor layer.

3. (Currently Amended) A semiconductor device comprising:

a first semiconductor layer that is formed from a first semiconductor material;

a second semiconductor layer that is formed from a second semiconductor material on above the first semiconductor layer;

a third semiconductor layer that is sandwiched between the first semiconductor layer and the second semiconductor layer and that is formed having a thickness that allows a quantum mechanical tunnel effect to be obtained;

a two-dimensional carrier that is formed within the first semiconductor layer and on the third semiconductor layer side of the first semiconductor layer;

a first concave portion that is formed extending penetrating at least the second semiconductor layer from a primary surface of the second semiconductor layer that faces the interface between the third semiconductor layer and the second semiconductor layer as far as the interface, and is formed from the interface to a predetermined depth in the first semiconductor layer.

a first electrode that is formed on a bottom surface and side surface of the first concave portion and that forms a Schottky junction between the first and second with the semiconductor layers which contact the bottom surface and the side surface of the first concave portion; and

a second electrode that is formed in an area of the second semiconductor layer that is located away from the first electrode and that forms a low resistance contact with the second semiconductor layer.

4. (Currently Amended)      The semiconductor device according to claims 1 to 3, wherein there is further provided a second concave portion that is formed extending from the primary surface of the second semiconductor layer penetrating at least the second semiconductor layer as far as the interface between the first semiconductor layer and the second semiconductor layer, and is formed from the interface to a predetermined depth in the first semiconductor layer, and wherein

the second electrode is formed on a bottom surface and side surface of the second concave portion, and forms a low resistance contact with the semiconductor layers which contact the bottom surface and side surface of the second concave portion.

5. (Canceled)

6.(Currently Amended)      The semiconductor ~~electrode device~~ device according to claim 1 or claim 3, wherein the second electrode is formed ~~so as to extend~~ from the primary surface of the second semiconductor layer ~~as far as to~~ to the two-dimensional carrier.

7. (Canceled)

8. (Currently Amended)      The semiconductor device according to claim 1 or claim 3, wherein, when viewed from a perpendicular direction relative to the primary surface, the second electrode surrounds the first electrode, and the inner surface of the second electrode is formed so as to sandwich face the outer surface of the first electrode.

9. (Original) The semiconductor device according to claim 1 or claim 3, wherein, when viewed from a perpendicular direction relative to the primary surface, the second electrode is formed so as to surround the first electrode.

10. (Original) The semiconductor device according to claim 1 or claim 3, wherein the first electrode is also formed on the primary surface of the second semiconductor layer that surrounds the first concave portion.

11. (New) The semiconductor device according to claims 1 to 3, wherein the forward current can be restricted when voltage is applied from the first electrode to the second electrode, and desirable voltage resistance characteristics occur when voltage is applied in the reverse direction.